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Agroforestry

MINIPAPER 4: Databases on Agroforestry
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Databases on Agroforestry

1. Introduction

Agroforestry (AF) has been concisely described as “farming with trees”. However it is broadly accepted that agroforestry is the combination of woody vegetation integrated with an agricultural use of the land from the bottom layer of the systems (Mosquera-Losada et al. 2016) has been recently defined.

Compared to monocrop-management agroforestry is a more complex production system based on the interaction of tree, crop and animal components. Therefore management of AF systems or shifting from monocultures to agroforestry is a challenge for most new agroforestry farmers. Management can be defined as “the process of making informed decisions and allocating resources to achieve one or more objectives”. The capacity of making “informed decisions” usually depends on access to relevant and accurate information.

Lack of information is one of the main constraints considered by AF land managers. In AGFORWARD participative project stakeholders stressed the need for making better use of existing information by e.g. setting up a database of sources relating to agroforestry or establishment of a platform for the exchange of knowledge, experiences and ideas. Proper use of these databases can a) help farmers to improve system management and explore new opportunities for agroforestry farming, b) stimulate networking of stakeholders c) provide background for (innovation-driven) decision making and d) reduce workload and improve effectiveness.

Existing AF databases exist in relation to i) the extent of agroforestry in Europe, ii) the types of systems and practices, iii) the location of experimental and demonstration sites, iv) access to models, v) description of the nature and extent of agroforestry policies, vi) contact for national agroforestry associations, vii) access to training resources, and viii) agroforestry images.

There are also non-AF specific databases – on soil, climate, market etc. - that contain relevant information for AF system managers.

The aim of this report is to examine the extent of existing databases which can guide decision making related to agroforestry in Europe and to identify remaining gaps and provide suggestions on how to fill them.

2. Review of existing databases and current initiatives aiming to bridge the gaps

2.1 Maps

Map of extent of agroforestry in Europe: Den Herder et al (2016) have collated and analysed the LUCAS database to describe the extent of agroforestry in Europe at national level under the concisely definition of agroforestry and Rosa Mosquera et al. (2016) have done for agroforestry practice in Europe at regional level considering the broadly use definition of agroforestry (connecting tree practices to woody vegetation and not only to tree).

The AGFORWARD website ([AGFORWARD, 2016d](#)) provides an interactive map describing the location of experimental and demonstration sites.

The EURAF website and the AGFORWARD website ([AGFORWARD, 2017e](#)) provides a map describing the head offices and the statues of the national agroforestry associations across Europe, as well as their main activities there are carried out at European level.

2.2 Descriptions of agroforestry systems, practices and policies

According to the FAO a “farming system” is “a population of individual farm systems that have broadly similar resource bases, enterprise patterns, household livelihoods and constraints, and for which similar development strategies and interventions would be appropriate. Depending on the scale of the analysis, a farming system can encompass a few dozen or many millions of households”. From this point of view there are already well known agroforestry farming systems linked to livestock production, such as dehesas (Spain), Montados (Portugal) and reindeer production in Boreal countries (Mosquera-Losada et al. 2009). In those, the presence of the woody component is essential to develop the agricultural production (mainly meat) in a sustainable way. In the dehesa, silvopasture and silvoarable practices including multipurpose trees are the main agroforestry practices involved. However there are other systems, like the modern ones in France that only employ silvoarable practices to deliver cereal production in a more sustainable way. Moreover, there are other systems, producing agricultural products that can be recognised as agroforestry systems, but that are not identified as agroforestry systems as such by farmers like for example the forest farming or the woodland grazing. Agroforestry systems are composed by one or different practices such as silvopasture, silvoarable, homegardens, riparian buffer strips and forest farming if the spatial scale is considered, or fallow lands integrating woody vegetation if the temporal scale is considered. The inventory of such as practices at EU level can be seen in Mosquera-Losada et al. (2016). From this, silvopasture, followed by homegarden are the most extensively agroforestry practices used in Europe. Several examples of agroforestry systems are shown on the AGFORWARD website together with descriptions of agroforestry systems and practices carried out by 40 European agroforestry stakeholder groups ([AGFORWARD, 2017c](#)). The above mentioned report contains also a detailed explanation of the nature and extent of agroforestry policies in Europe.

2.3 Access to agroforestry models

The long-term implications of agroforestry practices can be evaluated most effectively by the use of models. The agroforestry models include those that describe the biophysical interactions between trees and crops (eg. Yield-SAFE and Hi-sAFe) and those that allow assessment of the financial and economic implications (ie. Farm-SAFE).). The biophysical models are already calibrated for several crops and trees, which allows, by including temperature, precipitation and radiation to predict productivity for forestry, arable and agroforestry plots. These two models can be connected to the bioeconomic model FARM-SAFE, which allows farmers to select the best option to make their farms more sustainable by using agroforestry practices, which is also proposed in a temporal scale to make the economic inputs to facilitate the transformation from agricultural to agroforestry affordable. These models can be accessed through the AGFORWARD website ([AGFORWARD, 2017g](#)).

2.4 Access to agroforestry literature and training resources

As part of the AGFORWARD project, various training resources related to agroforestry have been placed on a single training resource website ([AGFORWARD, 2017a](#)). It provides agroforestry education and training resources appropriate for farmers, technicians and students.

The European Agroforestry Federation (EURAF) provides access to several reports, brochures, fact sheets and a grey literature repository in its [website](#).

Also [ForestryDegree.net](#) delivers an online resource collection through a database of almost 50 agroforestry research and organisations.

Within AgroFE project a [knowledge bank](#) has been developed with the short-term aim of providing AF resources for training eg. pictures, documents, videos, and AgroF-wiki.

2.5 Agroforestry images and videos

Since 2012, EURAF website provides access to a sort of agroforestry landscapes ([EURAF, 2012](#)). AGFORWARD also has established a database of European agroforestry images ([AGFORWARD, 2017f](#)) that will be linked and increased to the EURAF web page, once the project ends. More than 400 photos are available here for the public.

2.6 Agroforestry discussion fora

Agroforestry discussion fora includes the EURAF twitter, Facebook, website, and newsletter as well as the AGFORWARD Facebook page ([AGFORWARD, 2017c](#)). On AGFORWARD Facebook page up-to-date information, news and posts about agroforestry are available. The EURAF newsletter shows in a bi-monthly way activities related with agroforestry in Europe (featured farms), but also activities and meetings on which agroforestry is discussed.

2.7. Other related databases

Not AF-specific databases that contains information necessary or helpful for proper AF-management are also have to be mentioned here. These databases provide ie. agroecological, economical, or environmental information or serve as a repository of scientific literatures from different field of sciences. Some of these databases are listed in the table below.

Name of database	Type of database	Covered topics	Type of data provided	Address	Principal target group*
European Soil Data Centre (ESDAC)	thematic database	soil related data in Europe	datasets, services/applications, maps, documents, events, projects and external links	http://esdac.jrc.ec.europa.eu/	A
FAO databases	thematic database	food and agricultural	several, e.g. country stats, livestock production, landuse, agricultural market information	http://www.fao.org/statistics/databases/en/	S
FAO Agroecology Knowledge Hub	thematic database	existing knowledge on agroecology	articles, videos, case studies, books etc.	http://www.fao.org/agroecology/database/en/	A
ATTRA	thematic database	sustainable agriculture	tutorials, webinars, videos, publications etc.	https://attra.ncat.org/directories.html	A
OpenAIRE	network of Open Access repositories	open access to H2020, FP7 and ERC funded articles	peer-reviewed journal articles, conference papers and datasets of various kinds	https://www.openaire.eu/	A
AgEcon Search	open access repository	research on agricultural and applied economics	peer-reviewed journal articles, conference papers and datasets of various kinds	http://ageconsearch.umn.edu/	S
Encyclopaedia of Agriculture and Food Systems	UCB access only repository	agriculture and food systems	peer-reviewed journal articles	http://www.sciencedirect.com/science/referenceworks/9780080931395	S

FAOSTAT	free access up to 4000 records	food production, agricultural trade, forest products, and fisheries	international time series data	http://www.fao.org/faostat/en/#home	A
AGRIS	open access repository	papers, data, statistics, grey literature	agricultural research and technology	http://agris.fao.org/agris-search/index.do	A
STATISTA	free access to a part of the records	statistics	different sectors eg. agriculture and environment	https://www.statista.com/	A
EUROSTAT	free access to records	statistics	agriculture, environment, economics, trade, etc.	http://ec.europa.eu/eurostat	A
Organic Eprints	open access repository	scientific & conference papers, theses, reports, books articles, web products, project descriptions	organic food and farming	http://orgprints.org/	A
PubAg	open access repository	scientific journal articles by USDA researchers and peer-reviewed articles	agriculture	https://pubag.nal.usda.gov/pubag/home.xhtml	S
ESPON	database portal	indicators, maps and tools based on integrated data provided by European projects and organisations	territorial evidence	http://database.espon.eu/db2/ https://www.espon.eu/main/Menu_ToolsandMaps/	A
GlobAllomeTree	thematic database	assess biomass volume and carbon stocks based on tree allometric data	tree allometric data and software for allometric equation	http://www.globalometree.org/accounts/login/	F, S

* F=farmers; S=scientists; A=all stakeholder groups

3. What is lacking? Critical review of limitations and new initiatives aiming to bridge the gaps

Though there are already several sources of agroforestry knowledge, gaps are still existing in it. Part of the lack of information could be covered by research, but there are also non-research needs for filling these gaps.

Research needs include data requirements within a specific subject related to agroforestry. Experts of FG 22 highlighted the lack of integrated database on tree, crop, and livestock components and the lack of information on the value of ecosystem services provided by AF systems.

The availability of information on **plot level** was considered by experts very important and most useful for stakeholders, taking that management issues and decision making process are based on local, specific conditions. There are some specific issue – e.g. market information on agroforestry products and market possibilities, database of wood products price, tourism farm inventory – on which possible key databases are still missing.

Beside data complement and creation of new ones, database development should focus also on the issue of organising the **accessibility and transparency** of databases. This may require some research efforts (eg. assessment of stakeholders' expectations in order to identify the proper database structure, type and format of data) as well as non-research activity (e.g. set up of data management plan).

There are strong needs for **thematic databases** – i.e. database of practical videos and **case studies** for practitioners in all languages, local climate **data for current management activities**, the development of which are more practical than research activity. It was considered important by experts to **organise data in time laps**, step-by-step from planning through the establishment to the management of agroforestry systems, in order to create more effective, transparent and easy-to-use database for farmers. Certainly, not only technological or management-related data might be required by stakeholders but also database of educational information (trainings, tools, etc. at each level), extension services, and details about other AF stakeholders. (Stakeholders' needs for the different types of information are also discussed in other MPs of FG22, especially in MP 1, 3, 5 and 6)

Experts of this focus group highlighted the strong relevance of the development of a **map of AF systems** which includes basic information about farms and farmers. This could highly support networking of stakeholders and thus accelerate agroforestry innovation. A continuously growing map of AG systems has already been developed within AGFORWARD project ([link](#)). At the moment this map is limited to research and demonstration sites but could serve as a basis for a pan-European database of different type of AF systems.

Although simplicity is basic requirement for databases developed for farmers, sometimes it is unrealizable because of the special characteristic or structure of the database. In these cases, extension or complexity of the database or the lack of computer user experience may prevent farmers from using it. Therefore **training of people who** can locally provide **help** for farmers should also be involved in database development activities.

Apart from the above mentioned gaps, agroforestry knowledge is fragmented and in many cases the availability of it is limited i.e. the source is not known or the knowledge is available only for a specific group of stakeholders. As stakeholders' feedback prove in the AGFORWARD project, there is a strong need for an **integrated knowledge base** which makes available the already existing, but separate sources of knowledge and experiences for a wider scale of stakeholders. This must be broad scale, up-to-date, and able to renew and develop continually. In order to foster the knowledge exchange around AF in Europe and closing the existing research and innovation divide, development of an agroforestry knowledge cloud has been started within the frame of AFINET project. It aims to synthesize existing pools of information by including regional, national and international project results, grey and scientific literature, and knowledge coming from the stakeholders (experiences, innovations, etc.) This knowledge cloud will remain publicly available and updated in the long term through EURAF.

4. Conclusions

Though there are several sources of agroforestry knowledge, its fragmentation, the existing gaps and the limited availability prevent stakeholders from using databases to make informed decisions. Development of databases and platforms harmonised with local needs and specific requirements of the different stakeholder groups; development of an integrated agroforestry knowledge base; training people who can provide support locally for database users; and build up a database of AF systems are among the most relevant research and non-research needs identified by the expert group of FG22. Besides the initiatives aim at filling the above mentioned gaps, there is a huge need and space for further innovative actions.

5. Recommendations

Based on the conclusions derived from the critical review of the limitations, the development of local (national / regional / landscape and plot level) databases is crucial. Suggested innovative activities include the organisation of research / coordination / networking actions to i) build database on existing AF farms and successful practices, ii) to produce locally relevant data based on the assessment of the stakeholders requirements and data gaps identified by other MPs within FG22 and feed these data into an integrated and transparent database easily available for stakeholders, coupled with training activities and development of helpdesk service iii) to build topic-relevant co-operations on linking the value chain and AF landscape design.

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EURAF website - Resources

<http://www.agroforestry.eu/resources>

Forestry.Degree.net- online database of agroforestry research and organisations

<http://forestrydegree.net/agroforestry-resources/>

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